

— NONI —

THE TROPICAL CURE-ALL PLANT

Traditionally used in the Asia-Pacific region and more recently in the Western world, the noni plant is prized for its curative powers in treating everything from arthritis to wounds.

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Keying the word *noni* into an Internet search engine will return a plethora of information on the juice as a miracle solution to almost any medical problem. One could almost be forgiven for thinking it is no more than an aggressively marketed, foul-tasting sham. However, a closer examination reveals a plant used for centuries in medicinal remedies throughout the Pacific and Asian region, which more recently has gained credibility in both holistic and medical circles.

Morinda citrifolia (Rubiaceae) is a plant used traditionally in the Pacific area, particularly in Polynesia. It is commonly known as noni, but also by other names such as *Indian mulberry*, *ba ji tian*, *nono*, *nonu*, *cheese fruit* and *nhau* (Wang et al., 2002, p. 1128). The tree or shrub grows 3–6 metres tall and has large glossy leaves. Ripe fruit are pale yellow in colour, 3–4 centimetres in diameter and 5–10 cm long (CTAHR/University of Hawai'i website), and when mature have "a foul taste and odor" (Wang et al., 2002, p. 1128). The fruit is composed of hexagonal sections, each one where a flower once grew (Armstrong). A noni tree can produce fruit within 9–12 months of the time of planting, and in warm climates such as Hawaii can bear fruit all year round. The plant can be found in coastal areas up to 1,500 feet (457 metres) above sea level and tolerates salinity and brackish water. (CTAHR)

There are various theories on noni's origin, with some stating it is native to the Pacific and others asserting it was transported by humans from Southeast Asia. It is also said to be native to Australia (CTAHR) and there is evidence to suggest the plant originated in New Caledonia (McClatchey, p. 110). Because the seed contains an air sac at one end, the plant may have been naturally distributed throughout Polynesia. British explorer Captain James Cook observed noni being eaten in Tahiti in the late 1700s, and a British publication of the 1800s noted that noni was eaten in Fiji. According to later sources, *Morinda citrifolia* was consumed "throughout the Pacific Islands, Southeast Asia, Australia and India", with Australian Aborigines reportedly "very fond" of the fruit. The Burmese used noni in curries or ate it raw with salt. (Wang et al., 2002, p. 1128)

TRADITIONAL POLYNESIAN USES OF NONI

Will McClatchey of the Department of Botany and Cancer Research, University of Hawaii, spent time researching noni on Rotuma, an island north of Fiji. He saw the community as the most isolated and traditional he'd experienced in the Pacific. *Morinda citrifolia*, or 'ura to the locals, is used in a variety of ways and is the most commonly used plant medicine (McClatchey, pp. 114-115).

Leaves

Leaves may be used as a bandage once heated over a fire, as the leaf will then stick to itself. Chopped and macerated leaves are also put onto wounds. They are directly applied to treat burns and massaged into the head for headache and fever.

Newborns are covered in the leaves to promote breathing if help is needed, and new mothers are covered in a mixture of 'ura leaves boiled in coconut oil and mixed with turmeric powder for the "promotion of good postparturition health of the mother".

Noni leaves are also tied directly over skin when a broken or dislocated bone is set in place before splinting. Leaf juice is applied after a cleansing solution to stop bleeding caused by bone punctures. A concoction containing noni leaves is used in the treatment of skin disorders such as fungal infections.

The leaves are also used as a remedy for stonefish spine poisoning. Young leaves are pounded together with cleaned usogo plants and wrapped in a cloth with added coconut oil. The cloth is then wrapped with two noni leaves and heated over a fire. After the wound is enlarged with a knife, juice from the leaves is dripped directly onto the affected

area and also massaged from the surrounding area towards the wound. The whole process from preparation to pain relief is completed in around an hour.

Roots

Noni roots are also used in the treatment of stonefish spine poisoning. Clean 'ura root scrapings are wrapped in an *ununu* (a type of cloth made from coconut fibre) and sap from the leaf of a majila plant dabbed on the affected area after it has again been enlarged with a knife. The noni juice solution is then dropped into the wound. Pain is said to dissipate within five minutes of application and the inflamed area returns to normal within a few hours. Any leftovers from the mixture used in the procedure are to be disposed of in the sea.

Badly infected cuts are also treated with 'ura root prepared in the same way for a bone puncture and dripped directly onto the wound. Bubbling occurs, believed to be a sign of the infection being drawn from the area.

Fruit

Immature or green fruit juice is used externally in combination with other remedies or alone for treatment and pain relief of sores around the mouth. For sores inside the mouth, a concoction of noni juice and coconut oil is wrapped in an *ununu* and banana leaves and then heated. The juice is squeezed out and consumed. Larger doses of the same solution are given to children to induce vomiting where it is deemed necessary in conditions such as throat infections, for release of mucus, etc. Crushed, ripe fruits are applied in the treatment of cracked and peeling feet. (McClatchey, p. 115)

Rotumans also use pounded noni fruit mixed with water as a cough syrup for children, and boils are treated by leaves soaked in oil (United Nations University).

Hawaiian traditional uses of noni fruit have included topical application to treat skin conditions, sometimes with added salt or heating; the fruit was added to other remedies and consumed to cleanse the body, purify the blood and treat tuberculosis. Diluted juice is also reported to have been used to treat diabetes, heart trouble and high blood pressure. Women's breasts were covered with heated noni leaves and a prayer said to induce lactation. (McClatchey, p. 116) Bark extracts were used in the treatment of ringworm (McClatchey, p 112). A red pigment contained in the bark and a yellow pigment from the roots has been traditionally used for dyeing cloth. Hair was washed with extracted noni oil for insecticidal purposes, and noni fruit used as "famine food". (CTAHR)

Australian Aborigines traditionally used *Morinda citrifolia* as an antiseptic and wound dressing and to treat colds and diarrhoea; a yellow dye was extracted from the roots (Lindsay).

NONI AND TRADITIONAL CHINESE MEDICINE

Wang et al. note that "[d]ue to the limited scientific data, the *Yin/Yang* theory may be the best way to explain the beneficial effects of the Noni plant through the regulation of balance between *Yin and Yang*".

A balance of yin and yang is necessary for a healthy body. In traditional Chinese medicine terms, noni "...is able to tonify *Qi*, clear heat and toxins, and invigorate the blood. The properties of this plant are sweet, stinky, and neutral. Noni enters the lung, spleen, liver, and kidney meridians". This means that *Morinda citrifolia* can be used to treat many health conditions (Wang et al., 2002, pp. 1137-1138).

RESEARCH INTO NONI'S BIOCHEMICAL PROPERTIES

One of the most common marketing claims found on the Internet regarding noni is that the reason it is so effective is because it contains a substance known as *xeronine*.

Dr Ralph Heinicke identified this enzyme when he was studying pineapples and searching for an unknown ingredient found in bromelain. He named the new alkaloid xeronine. He named the precursor to xeronine *proxeronine*, and noted that although "noni fruits have a negligible amount of free xeronine, they contain appreciable amounts of the precursor of xeronine". Heinicke advises that noni should be taken on an empty stomach because otherwise the pro-enzyme may not become properly activated, therefore not reaching the intestine. He notes that "years of research" are needed to "demonstrate convincingly how xeronine functions at the molecular level in a cell". (Heinicke, 2002)

Dr Neil Solomon explains Heinicke's work by stating that noni acts as an adaptogen, enabling sick or weakened cells to return to normal. He gives an example of how this may happen in the case of either an overactive or underactive thyroid, explaining that "an adaptogen, such as noni, could help increase the body's production of the thyroid hormone and bring the body back to homeostasis, or normal balance". (Solomon, 2002)

McClatchey cites Heinicke's initial report on xeronine, published in the *Pacific Tropical Botanical Garden Bulletin*, commenting that it is unreferenced. "It is interesting that this seemingly biochemical report is published in the bulletin of a botanical garden, because it may have been better published in the 'Journal of Irreproducible Results'. No chemical

structure is given for the 'alkaloid' xeronine, although many results are discussed without a clear indication of the scientific research from which they are derived." In addition, McClatchey notes that he has "not located any subsequent publications reporting a structure for xeronine or proxeronine, although much chemical work has been conducted". He believes that if this is the case, "Heinicke's report should be in question. If, on the other hand, xeronine is described, then this may lend support to his other findings and open the door for production of specific commercial products". An editor's note accompanies McClatchey's work, stating that xeronine and proxeronine were not found during extensive searches of various scientific databases. (McClatchey, 2002, pp. 116, 117, 120)

Australian Noni juice supplier, Tree of Health, commissioned the Centre for Phytochemistry at Southern Cross University, New South Wales, to "investigate noni juice and noni fruit powder to determine a baseline fingerprint of the compounds contained in noni". The results showed the presence of a substance known as *scopoletin*, which acts as an antioxidant, lowers cholesterol and exhibits vasodilating properties. Because *scopoletin* can dilate constricted blood vessels, "high blood pressure can be normalised and less wear and tear on the cardiovascular system results". Glycosidic compounds were found, and one known as *asperuloside* is traditionally used to reduce water retention, inflammation, varicose veins and phlebitis.

Polysaccharides such as glucuronic acid, galactose, arabinose rhamose, glycosides and trisaccharide fatty acid ester have been shown to have immunostimulatory, immunomodulatory, antibacterial, antitumour and anticancer effects (Russell, 2003).

The founder of Tree of Health, Helen Russell, notes: "Future research aims to identify components that have the capacity to be health promoting as well as focussing on the anticancer properties of the glycosides found in the noni. Our aim is to be at the

Heinicke advises that noni should be taken on an empty stomach because otherwise the pro-enzyme may not become properly activated, therefore not reaching the intestine.

forefront of providing credible research to back the anecdotal evidence of noni across a wide array of health conditions." (Russell, 2003, pp. 1-2)

Scientific American reported in 2000 that Filipino chemists from the University of Santo Tomas had found compounds in the noni leaf that were able to "kill the bacterium causing tuberculosis". The leaf extract steroids "killed 89 percent of *Mycobacterium tuberculosis* organisms exposed". The steroid structure found was very different to any used in TB drugs, and lead researcher Jonel Saludes was quoted as saying, "I hope that pharmaceutical companies will pay attention to this research and explore the noni plant as a potential source of drugs". (Leutwyler, 2002) However, there are repercussions for biodiversity if pharmaceutical companies patent substances found in plants.

Researchers from the Université de Metz in France found the traditionally reported analgesic effects of noni to be proved in tests on mice. The animals were tested in various ways after being administered high doses of aqueous extract of *Morinda citrifolia* roots. The investigation showed that "these results are suggestive of sedative properties". No toxic effects were exhibited. (Younos et al.)

Research chemist Joseph Betz from the FDA's Division of Natural Products, Center for Food Safety and Applied Nutrition, reported that noni had "been tested for a number of biological activities in animal and anti-microbial studies". The dried fruit was found to have "smooth muscle stimulatory activity and histaminergic effects". (Wang et al., 2002, p. 1129)

NONI'S ANTICANCER PROPERTIES

Several tests have been undertaken following claims that noni contains anticancer properties.

Researchers from the University of Hawaii and Rutgers University undertook such a study, noting that noni was "one of the most effective medicinal plants utilized by native Hawaiians...for a variety of ailments, including the treatment of breast cancer by at least one Polynesian community". They also comment on the modern use of noni in Hawaii as "the second most commonly used ethnobotanical, mainly for the treatment of cancer, hypertension and diabetes". Extracts from noni fruit were tested on breast carcinoma, resulting in "inhibition of cancer cell growth". (Fong et al., 2001)

Another study from the University of Illinois, at Chicago College of Medicine, was to test the hypothesis "that *Morinda citrifolia* possesses a cancer preventive effect at the initiation stage of carcinogenesis". Tahitian noni juice (TNJ) was tested on rats with liver injury induced by a liver carcinogen, and researchers concluded "results suggest that prevention of carcinogen-DNA adduct formation and the antioxidant activity of TNJ may contribute to the cancer preventive effect of *Morinda citrifolia*". (Wang & Su, 2001; Wang et al., 2002, p. 1134)

Liu et al. (2001) found that two novel glycosides extracted from noni fruit juice and administered to mice "...significantly prolonged the survival duration of inbred Lewis lung tumor-bearing mice. Juice of noni containing a polysaccharide-rich substance known as 'noni-ppt' was suggested to suppress tumor growth through its regulation of the host immune system".

Brian Issell from the University of Hawaii is currently undertaking a two-year study of the effects of noni on cancer patients, testing the hypothesis "that noni at a specific dosing provides cancer patients with a sufficient benefit to toxicity profile to

be useful as a therapeutic". The study aims to:

1. Determine the maximum tolerated dose of capsules containing 500 mg of freeze-dried noni fruit extract.
2. Define toxicities associated with the ingestion of noni.
3. Collect preliminary information on the efficacy of noni in respect to anti-tumor and symptom control properties to help select specific patients for subsequent Phase II studies.
4. Identify chemical constituents of the extract that can be used to characterize the bioavailability and pharmacokinetics of noni food supplement." (The Noni Study, www.hawaii.edu/crch/CenStudyNoni.htm)

ANECDOTAL EVIDENCE FOR NONI'S BENEFITS

In his book, *The Noni Phenomenon*, Dr Neil Solomon reports on his extensive research into the effects of noni, for which he interviewed 50 doctors and health professionals representing over 10,000 people taking noni juice. An average of 78% of these people experienced some positive results. The highest percentage overall was 92% of people reporting increased energy levels. Other reported results from noni juice intake included decreased symptoms of allergy, arthritis, cancer, depression, heart disease, high blood pressure and pain. It was also said to help against ageing, and improvements were noted with breathing, diabetes (types I and II), digestion, thinking, kidney health, alertness, sexuality, sleep, stress and well-being. It also reportedly aided in increasing muscle, losing weight and relieving stroke symptoms. The lowest score was for quitting smoking, in which 58% of people reported that noni had helped. It was noted that these results were a "pooled percentage of people who experienced objective and/or subjective improvement of their signs/symptoms after taking noni". Dr Solomon also advises that noni can be taken with medication and that less than 5% of people reacted negatively to noni, with symptoms such as "minor belching, loose stools, allergy or...mild rash". (Solomon excerpt from California Academy of Health, 2003)

Dr Solomon also recently conducted a study regarding noni's use as "nature's Viagra®". Of the 1,545 individuals involved, "88% claimed their sex lives improved after drinking noni". Dr Solomon hypothesises that this may be because noni contains arginine—a substance thought to improve circulation and increase sperm count and motility in men, and increase the production of nitric oxide in women, leading to "improved engorgement and lubrication resulting in a more natural, enhanced sexual response". (INCC media release, 2003)



"Did you bring two mobile phones?"

Australian-based distributor Tony Mastop receives positive feedback regarding noni and has found the juice beneficial personally. A massage therapist suffering from back pain, he began taking noni for anti-inflammatory and analgesic reasons. He initially had positive results but after switching juices, the pain returned. "Not all noni is the same," explains Tony. "The potency varies, and for back pain relief I needed the stronger stuff." However, for those who retain iron in their bodies, less potent noni could be the safer option, as stronger juice may adversely affect their health.

Parkinson's disease symptoms may also be eased with the aid of noni juice. The grandfather of a friend, Eloise Brock, takes noni and finds it gives him considerable relief. However, he does not take it consistently. "He really is a lot better when he takes the noni," says Eloise. "Nan would like him to stay on it all the time, as she notices how much his quality of life improves while taking noni juice." Unfortunately, the high cost of noni juice can make it prohibitively expensive for some people.

Tahiti native Gnit Fa takes noni juice every day at around 6.30 am and finds it very beneficial, still experiencing positive effects by the evening. "When I take other vitamins (European or Chinese), I don't feel as good. With noni I feel more energetic; even my muscles feel more energetic." However, not all the family has had positive results; some have attributed their rotten teeth and diarrhoea to taking noni. Gnit Fa says there is talk of a new noni manufacturing plant opening in Tahiti, which will produce noni juice, soaps and other products made from noni.

Some people have reported no real benefit from noni, and companies marketing the product suggest it should be taken for a minimum of three months—as "[s]ome people notice results in just a few days and other people don't see a change until several months later" (<http://www.Noniland.com>).

NONI PRODUCTS AND FOOD STATUS

There are various forms of noni available. The 100% juice is extracted by placing ripe fruit over large screens; the liquid then drips through into tubs underneath (International Noni Communication Council). Traditional noni juice in Hawaii is drip-extracted, then fermented and aged, and is unadulterated; non-traditional juice is freshly squeezed, filtered and not fermented (CTAHR).

When bottled, the juice is dark brown in colour and "can be difficult to palate because of noni's inherent strong taste". Puréed noni is also available and may be more palatable as it often contains flavouring juices. However, this means it is less potent. Noni tablets and capsules are available but because there is "a lack of scientific research on dried or dehydrated noni, its efficacy in this

state is largely unknown". Powdered juice is the other alternative and reportedly it has a good flavour. However, as it is made from dehydrated noni, the same concerns are relevant as for tablets or capsules. (INCC)

Noni juice is accepted as either a food or food supplement in many countries, including Australia and the USA, although the US Food and Drug Administration recommends pasteurisation in order to kill any harmful bacteria grown during harvesting or bottling. However, pasteurisation has been known to kill enzymes, and certain enzymes in noni are thought by some to be the active ingredient with health-promoting benefits.

On 5 June 2003, the European Union authorised noni juice to be placed on the market as a "novel food", which the EU defines as "foods and food ingredients that have not been used for human consumption to a significant degree within the EU before 15 May 1997". To reach this status, safety assessments must be undertaken and the ruling allows noni juice to be used in pasteurised fruit drinks in the European Union. (*Midday Express*, 10 June 2003)

AN ALTERNATIVE FUTURE

The Hawaiian Department of Business, Economic Development and Tourism refers to noni in its September 2002 report regarding strategies for Hawaii's economy. Alternative medicine is acknowledged as being widely used by Americans, and noni is referred to as "an outstanding example of this new reliance on alternative therapies". Furthermore, a new Department of Complementary and Alternative Medicine (CAM) at the University of Hawaii aims to "become a leader in medical education and research, integrating western and alternative medicine practices". The report states that promising preliminary results regarding the medicinal properties of noni have already come out of the new CAM department.

Though noni may not suit everybody, many people report significant benefit from their daily dose of the juice. Scientific studies regarding *Morinda citrifolia* are promising, particularly in relation to noni's usefulness in inhibiting certain types of cancer. Many in the industry acknowledge that more scientific studies are needed to show what those using noni traditionally have known for centuries—that noni has significant health benefits and medicinal properties.

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